Park News
Great Basin National Park
National Park Service
U.S. Department of the Interior

The Midden

The Resource Management Newsletter of Great Basin National Park

Restoration of Johnson Lake Mine Historic District

by JoAnn Blalack, Archeologist, Great Basin National Park

Photo by G. Baker, NPS

The bottom logs are usually the most damaged so are removed and replaced.

The Johnson Lake Mine Historic District is located between 10,200 and 10,800 feet in upper Snake Creek Canyon. The district is approximately 100 acres in size and was the first tungsten mine site in Nevada listed to the National Register of Historic Places (1995).

During late summer of 2006, a log cabin stabilization crew from North Cascades National Park in Washington State worked on the largest cabin, known as the cookhouse, to replace deteriorated logs and straighten the building. The same crew will be back this summer to finish the cabin and work on the stamp mill.

The crew uses hydraulic lifts, pulleys, wedges, and other tools to lift up and support the roof while replacing logs that have been eaten away by insects. Rocks are inserted as a foundation to help preserve the logs. Sections of the cabin are tied together to make it safer for visitors to enter. During the process of cabin restoration, the area is searched for additional historical relicts that can help tell the story of what occurred in this area.

The beginning of the Johnson Lake Mine is somewhat obscure. In 1909 Alfred Johnson filed an application for mining and power rights in Snake Creek Canyon, though it was unknown as to what mineral he planned to mine. In 1912, John D. Tilford is credited for being the first discoverer of tungsten ore along Snake Creek. Information on Johnson Lake Mine indicates that Alfred Johnson and J. S. Dearden were operating the mine by 1916 and that it operated off and on until 1935, when an avalanche destroyed a majority of the operations.

Tungsten was sought after because it is an important mineral used in the production of alloy steel. Steel made with tungsten is self hardening, wear resistant and has the necessary properties for tool and die casting. Tungsten also was used in the production of incandescent light bulbs. The increase of tungsten in steel making also coincided with World War I.

Today as you hike the 3.5 mile trail to the site, you will be hiking the road that was used to bring in supplies to the mine and bring out the ore. The first building that you will see is the remains of the two-story stamp mill. The stamp mill is where the ore from the mine was brought and crushed into smaller pieces for easier transport to the railhead in Frisco, Utah which was about 75 miles away. Frisco itself is now a ghost town.

As you continue up the trail another half mile you will come to a large meadow surrounded by conifers. Here you will find four log cabins of different sizes scattered among the trees. All are missing their roofs except one that has a partial roof. You will also see Johnson Lake. This lake has a small earthen dam that was built by Johnson and Dearden for a constant water supply to run the stamp mill.

The historic district is next to the Johnson Lake trail, which climbs 2,500 feet from the end of the Snake Creek road. You are welcome to visit the site. Plan on at least a half-day hike and check with the visitor center for necessary gear and weather conditions. Please leave the buildings and any other items you encounter as you found them so that other explorers can enjoy the area.

In This Issue

Improved Lighting of Lehman Caves

By Ben Roberts, Physical Science Chief, Great Basin National Park

Since the first electric cave lights were installed in Lehman Caves in 1941, incandescent bulbs have been the lighting fixture of choice. Incandescent bulbs last an average of 200 hours, are fragile, operate at high temperatures and consume an average of 11,200 watts of power in the cave. They also give off yellow tinted light that hides the true color of cave formations and encourages algae growth.

During last summer, fall and winter, park staff have replaced the incandescent bulbs with Light Emitting Diodes (LEDs). LEDs last an average of 50,000 hours, are resistant to shock, operate at low temperatures, and consume one third the amount of electricity. The truer color rendition of LED's show off the caves wide range of colors and should reduce algae.

Photo by B. Roberts, NPS

Gothic Palace with old lights.

Photo by B. Roberts, NPS

Gothic Palace with new LED lights.

New Millipede Receives Name

The newly discovered cave millipede found in Water Trough and Model caves was identified by taxonomist William A. Shear of Hampden-Sydney College as a new species to science. He named it *Idagona lehmanensis*. Millipedes in the genus *Idagona* were previously only known in Idaho from lava tubes. The species name *lehmanensis* refers to Lehman Caves National Monument, the precursor to Great Basin National Park.

His description was recently published on the online journal of *Zootaxa*, which is a rapid international journal for animal taxonomists available at http://www.mapress.com/zootaxa/
Both the caves where this 25 mm (1 inch) long millipede reside are rather wet. Millipedes feed on detritus, fungi, and bacteria.

Using a Glacial Chronolgy to Determine Climate up to 11,500 Years Ago

By Shaun A. Marcott, Ph.D. Student, Oregon State University

Great Basin National Park is of interest to paleoclimatologists because of the abundance of natural climate documentation within such a small area (less than 30 km). Both the Bristlecone tree ring record and the stalagmite (or speleothem) records from Lehman Caves provide detailed information about past climate changes in the Great Basin, as well as current studies looking at lake cores.

Photo by G. Baker, NPS

View of Wheeler Rock Glacier from Wheeler Peak.

We will be adding to the paleoclimate data by using ^{10}Be (beryllium) dating of quartzite boulders from several moraine crests near Brown Lake (~1 km northwest of Wheeler Rock Glacier). This dating will address spatial and temporal glacier variability in response to Holocene climate variations. The Holocene epoch is a geologic period that extends from about 11,500 years ago to today.

The boulders are dated looking at cosmogenic nuclides in their surface exposures. These dates help to clarify glacial sequences and have proven useful in developing the timing of glaciation in areas such as the Wind River Range in Wyoming and Yellowstone National Park. We will be implementing it both at Great Basin National Park and several other alpine sites across the western United States in order to develop a regional glacial history for western North America.

By combining our glacial chronology with the stalagmites and tree rings data at Great Basin National Park, a well-dated climate scenario can be developed for the last 10,000 – 11,500 years. Great Basin National Park is unique in that few places in the world afford scientists this opportunity to develop such a detailed record of climate using multiple parameters so close together.

For additional information about this research, visit http://proglacial.com.

Western National Parks Association Grant Awarded to OSU

Ohio State University (OSU) Geography professors Jason Box, David Porinchu and Bryan Mark have been awarded funding from the Western National Parks Association (WNPA) for a one-year research project entitled: “Contemporary Climate History and Climate Change Impacts in Great Basin National Park.” The three principle investigators will continue with their multidisciplinary research and education initiative which was featured in the Winter 2006 edition of *The Midden*.

The project has three primary components: (1) a meteorological network to assess climate variability throughout the park; (2) lake sediment cores to develop a more detailed climate history; and (3) an evaluation of climate impacts to hydrology using hydrochemical and temperature sampling of surface waters, digital photogrammetry of rock glaciers, and a lake surface energy budget experiment.

A short core recovered from Stella Lake in 2005 was analyzed for subfossil chironomid remains (also known as non-biting midges). Application of water temperature transfer function to the Stella Lake midge stratrigraphy provided a means to reconstruct past water temperature fluctuations (see Figure 1). It appears that temperature fluctuations at Stella Lake closely follow fluctuations in Austin, NV and that the lake has experienced higher water temperatures post-1980.

A datalogger was installed below Brown Lake at a spring outlet that flows into Lehman Creek. It measured the lowest water temperature in September, after all winter snow had already melted. This suggests a cold source of water due to a delayed winter snow melt cold pulse or a subterranean ice melt signal. If it is the second, then it indicates continued deflation of the ice cored rock glaciers. Future study will examine the time delay for Brown Lake waters to make it to the spring outlet.

The WNPA research grant program supports scientific research that benefits “the management, preservation, and interpretation of National Park Service resources served by the Association.” All proposals must be approved by park Superintendents and are reviewed annually by WNPA’s Research Committee consisting of board members with extensive background in science. Grants are limited to no more than $7500 per project per year.

The modest award will greatly assist the OSU researchers, who hope to establish the research and education program as a permanent part of an integrative physical and human geography curriculum. Box, Porinchu and Mark are all junior faculty members and have been laying the ground work during annual visits to Great Basin National Park since 2005. The OSU team will return to the park this August for their third visit, and will be accompanied by at least two student researchers and possibly additional faculty members.

Any researchers who are conducting similar research are encouraged to contact the team by email:
box.11@osu.edu (Box);
porinchu.1@osu.edu (Porinchu);
mark.9@osu.edu (Mark).

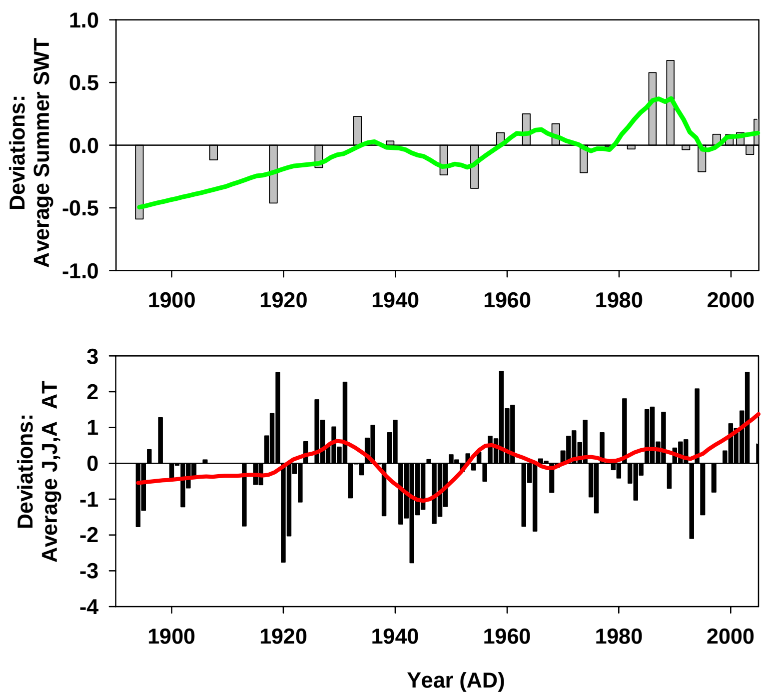
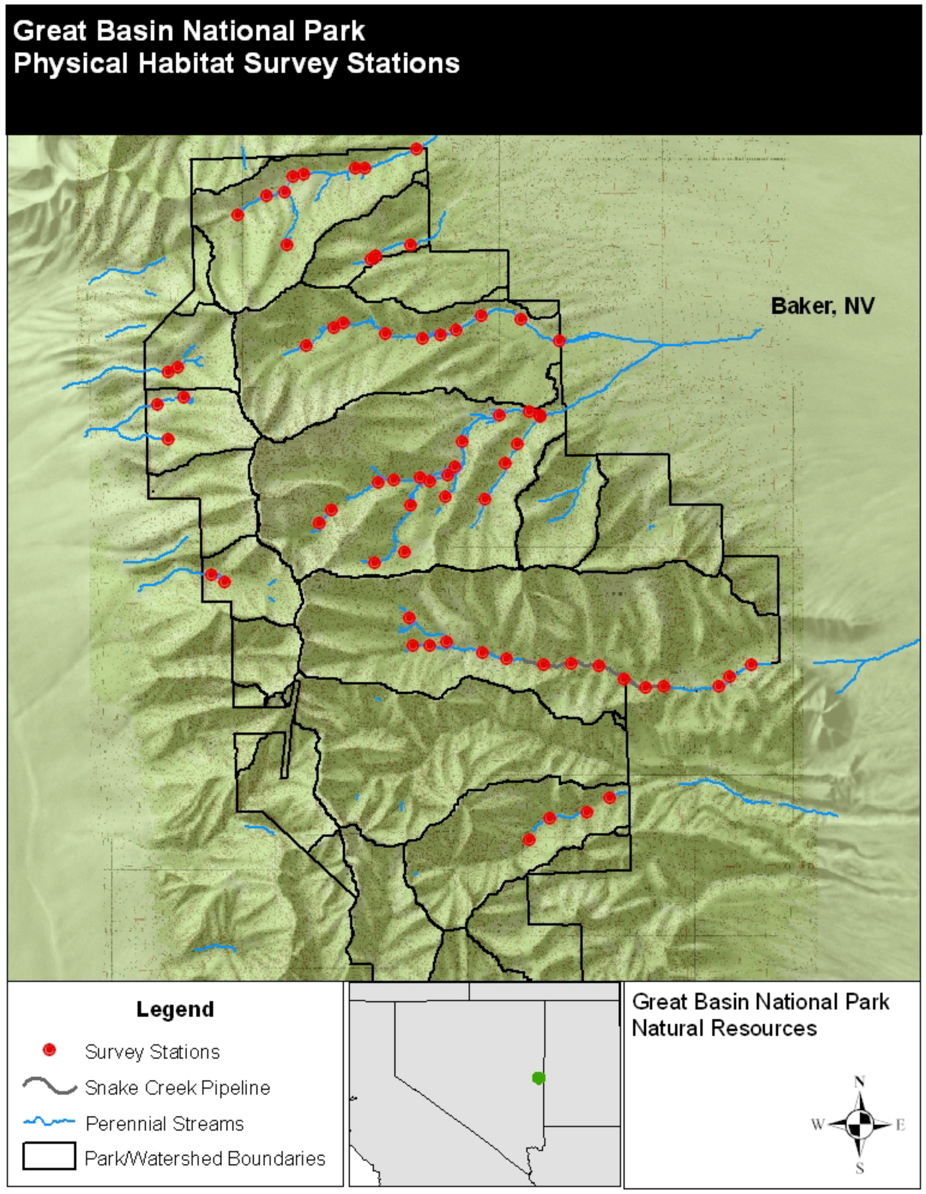


Figure 1. Chironomid-based surface water temperature reconstruction for Stella Lake spanning the interval AD 1895 – 2005 (based on ^{210}Pb analyses). This figure depicts the deviations of the chironomid-based surface water temperature estimates from the average surface water temperature from AD 1895 – 2005 and the deviations of air temperature from long-term average air temperature over the period AD 1895 – AD 2005 for Austin, Nevada (NCDC, 2006). The heavy, solid lines represent a LOWESS smoother.

Physical Habitat Surveys Completed on All Park Streams

By Meg Horner, Biological Technician, Great BasinNational Park



In 2006 all of the park's streams were targeted for physical habitat surveys using the Environmental Protection Agency's Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers. Data was collected for a variety of parameters detailed below. In addition, a habitat assessment score (optimal, suboptimal, marginal, and poor) was determined for each survey location.

All of the data and assessment ratings help to establish a baseline reference condition for each stream and watershed that will be comparable to future physical habitat surveys conducted at these sixty-nine permanent survey stations, each 100 m (107 yd) long to assess any changes or alterations that could adversely affect the aquatic communities present.

The last time a similar habitat survey was conducted was in 1952 by T. C. Frantz. In 2002 Erik Beever and David Pyke examined some characteristics at sites in four main watersheds (Baker, Lehman, Snake, and Strawberry Creeks). Beever and Pyke used a more intensive sampling regime that will also be repeated periodically to detect changes.

The results of the 2006 surveys showed Baker Creek to have the most pristine stream and riparian habitat of all the creeks surveyed. Lehman Creek and Snake Creek also received high ratings. Pole Canyon within the Baker Creek Watershed averaged the lowest habitat assessment score. This creek scored poorly during the 2006 survey because it had very low water levels, a small riparian area encroached upon by non-riparian plant species, and bank erosion.

Instream features including stream width and depth and surface velocity were measured. Baker Creek was the widest stream in the park at the time of the survey averaging almost 4 meters (12.5 ft) across. The narrowest creek was Timber Creek, also in the Baker Creek watershed, which averaged 0.5 m (1.6 ft) across; it was also the shallowest creek measured, averaging 5 cm (2 in) deep. Strawberry Creek had the greatest stream depth in 2006 averaging 30 cm (12 in) deep. South Fork Baker Creek had the greatest average surface velocity at 1.8 ft/second.

Stream morphology was described for the survey as three types including riffles (shallow turbulent water), runs (medium depth smooth water), and pools (deep water). The streams within Great Basin National Park in 2006 were dominated by riffles which averaged

Stream Physical Habitat Surveys (continued)

greater than 70% of the stream morphology while pools deeper than 20 cm (7.8 in) accounted for 10-25%. Runs rarely accounted for more than 5% of the stream morphology.

The streams' substrate components were also measured and cobble rocks between 64- 256 mm (2.5 -10 in) were the most dominant component. Boulder and gravel substrates were also common.

The riparian vegetation along the streams within Great Basin National Park were surveyed for dominant species, canopy cover, the extent of the riparian area, and the amount of bank protection from vegetation. The most dominant species recorded were Woods' rose, aspen, willow, water birch, white fir, and Douglas fir. The canopy cover of the surveyed streams was labeled as partly shaded in all survey reaches except for five that were labeled as partly open. The shaded areas along these streams will allow the water temperature to stay cooler and increase the amount of area fish can use as cover.

The extent of the riparian area for the streams within the Park was rated as suboptimal or marginal at many survey locations. Riparian plant species barely extended beyond a few meters from the stream bank and in turn negatively affected bank stability.

The 2006 physical habitat survey indicated that the watersheds within Great Basin National Park are in good condition, and most are in optimal condition. However, there were some shortcomings that were highlighted by the survey including the loss or lack of suitable riparian area in part caused by the encroachment of pinyon pine and white fir into riparian areas.

Future stream physical habitat surveys will help to assess watershed health within the Park and detect any changes or alterations within the aquatic communities.

Ants Underfoot

By Jon Hurst, Data Technician, Great Basin National Park

Over 60 ant species have been documented in White Pine County, Nevada, and 23 of these have been found in the park. Many more species likely occur in the park but have yet to be documented. Close inspection of the ground and plants in almost any corner of the park will reveal ants.

Although often seen as annoyances, ants play important roles in almost all ecosystems, including those in and around Great Basin National Park. In the Great Basin, ants are important predators of other small insects and invertebrates, and they turn over and aerate the soil as much as or more than earthworms. They are also major consumers and dispersers of seeds, especially the aptly named harvester ants, of which two species are local.

Photo by University of Houston

Harvester ant mound.

Harvester ants (genus *Pogonomrymex*) are also infamous for their painful stings. Although many ants bite with their powerful mandibles when agitated, some ants also sting like wasps or bees. Stinging ants first bite their victims to gain leverage for pressing their stingers through exoskeletons or skin, followed by injection of venom. Harvester ant venom is the most toxic insect venom known, and is three to twelve times more potent than bee and wasp venoms, depending on the ant species. Although ant stings can be painful, you are very unlikely to experience one without deliberately disturbing a colony.

Next time you are in the park or in the wild, take a moment to notice the fascinating behavior of these abundant and important insects. If you are an ant enthusiast or expert that would like to contribute toward further documenting Great Basin's ant species, please contact Resource Management for information about doing research in the park.

Junipers of Great Basin National Park

By David Charlet, Professor of Biology, Community College Southern Nevada

Of all of Nevada's 314 mountain ranges, the Snake Range possesses more tree species than all but two mountain ranges, the Carson Range near Lake Tahoe and the Spring Mountains near Las Vegas. In the Great Basin region, conifers rule the mountain landscapes because of their drought and cold resistance. Their waxy, linear leaves are wonderfully disposed to protect them from both extremely cold temperatures and long periods of low water availability. The "evergreen" condition of the Great Basin's conifers doesn't mean that they don't lose their leaves--they do, just not all at once. And they can keep their leaves for very long periods of time, especially in the Great Basin. Singleleaf pinyon pine (*Pinus monophylla*) commonly keep their leaves for 15 years and up to 40 years, and bristlecone pines (*Pinus longaeva*) for up to 50 years before shedding them.

In this issue we will learn about junipers, members of the Cypress Family, or Cupressaceae. In the Great Basin there are five species of junipers, three of which occur in Great Basin National Park.

From whatever direction you approach Great Basin National Park, probably the first tree you will see as you climb the mountain toward the park boundary will be Utah juniper (*Juniperus osteosperma*). The global distribution of Utah juniper is from eastern California to Utah and the six states that Utah borders. Except for the extreme northwestern portion of the Great Basin, Utah juniper is present and often dominant throughout the mountains of the Great Basin, and at Great Basin National Park it is one of the most abundant of all tree species. Utah

Photo by D. Charlet

Utah juniper leaves and berries.

juniper dominates large parts of the ecosystem complex that the park is centered on, as well as much of the low elevations within the park boundaries. On the Snake Valley side of the mountain, Utah juniper begins at about 6,000 ft elevation in washes and draws and about 6,200 ft on flat ground, generally about 500 ft above the valley floor. On the Spring Valley side of the mountain, Utah juniper begins at about 6,800 ft. From about 6,500 to 8,000 ft it shares dominance with singleleaf pinyon, and continues sparingly to around 9,000 ft at its upper limits.

You can recognize Utah juniper by its scale-like leaves pressed against the stem, and these leafy stems slightly more than 1 mm in width. All individuals have both male and female cones, but as with all junipers, the female cones ("berries") are wrapped in a fleshy, bluish seed coat. The stem is usually white to gray to gray-tan, its outer layers peeling. This juniper can be very long-lived, and there are many ancient stands in and near the park, with individuals easily 500-1,000 years old, but barely six to 10 feet tall. In their youth, these junipers are ball-like, with pointy tops. As they age, their canopies broaden and they either retain several stems close to the ground or become more upright and tree-like. When the wind blows hard, these trees seem only to shudder.

If you are at the lower elevations of mixed pinyon-juniper woodlands and near a stream, you are likely to find a juniper that looks a little different from the Utah juniper. You have probably found what is called the Rocky Mountain juniper (*Juniperus scopulorum*). Its bark is also shreddy and can also be grey, sometimes grayish-red, but never whitish. The "berries" are smaller, and the branchlets with leaves are always just under 1 mm wide, but only some trees will have berries, while others will have only male cones. When the pollen is being released from the male cones and when the berries are ripe, you may think you are seeing two different species, as the males will have a brown-amber hue and the females will be bright and bluish. The branches have a tendency to droop, and when the wind blows hard, the branches show much more movement than the Utah junipers. Rocky Mountain juniper is much broader in its distribution than Utah juniper, from western Canada to southern New Mexico. It is aptly named, as its distribution is centered on the Rocky Mountains and occurs very nearly its entire length. In the park, the species descends below park boundaries in the east to 6,000 ft elevation in Snake Creek and up to 9,140 ft at upland sites. It is

Photo by D. Charlet

Rocky Mountain juniper.

Photo by D. Charlet

Rocky Mountain juniper leaves.

abundant only along streams and occurs occasionally in drier parts of the montane forests, above the pinyon-juniper woodlands.

If you came to the park from Spring Valley, you may have noticed that in a few places in the valley there are open woodlands of evergreen trees. These trees are also Rocky Mountain juniper, but they occur in a very specialized habitat and defy the elevation distribution controls mentioned above. These woodlands occur in the valley bottom. Their environment is considerably different than that of their relatives on the mountain, as their roots are often bathed in saline water, and their summers are much warmer. These special populations of Rocky Mountain junipers have been called "swamp cedars" by some, and may be an undefined species or variety of Rocky Mountain juniper. Even if they are not a distinct species or subspecies, they are almost certainly what is called an "ecotype" of Rocky Mountain juniper. What we mean by "ecotype" is a population of a species that has particular (and usually peculiar) conditions at its site that allow it to persist or thrive. If the site is peculiar enough, individuals with heritable variations that favor them in the particular circumstances survive, reproduce, and so affect the gene pool of the population, causing a shift of the genetic characteristics of the population. This is evolution, and in the Spring Valley we may be witnessing the creation of a new species by natural selection.

At the park we have a third juniper, the common juniper (*Juniperus communis*). The eminent Elbert Little, Jr., Chief Dendrologist of the USDA Forest Service, lists this species as an official U.S. tree, although I have never seen the species adopt an upright, tree habit here in the park. Tree-like, 10-foot tall individuals occur in the Jarbidge Mountains in the northern Great Basin. Here in the park you will find these as low shrubs at lower elevations in the forest beginning at about 7,600 ft at wet sites, and above treeline as high as 11,360 ft on Bald Mountain and elsewhere.

You can recognize common juniper as a juniper by its blue-gray "berries," but its leaves are needle-like rather than scale-like. Common juniper leaves do not lie down along a little stem, and are not soft and easy to handle like Utah juniper always is and Rocky Mountain juniper usually is. Instead, the branchlets of common juniper are downright prickly! It is prickly because the needle-like leaves have a joint at their base, which prevents them from lying down along it but instead protrude from the stem at about a 30° angle, their sharp tips prickling the skin. It is named "common juniper" probably because the species occurs in high mountains around the northern hemisphere, from central Asia to the Alps to the Rocky Mountains and Sierra Nevada in western North America.

Photo by D. Charlet

Common juniper leaves and cones.

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The Midden is the Resource Management newsletter for Great Basin National Park.

A spring/summer and fall/winter issue are printed each year. The Midden is also available on the Park's website at www.nps.gov/grba.

We welcome submissions of articles or drawings relating to natural and cultural resource management and research in the park. They can be sent to:
Resource Management,
Great Basin National Park,
Baker, NV 89311
Or call us at: (775) 234-7331

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What's a midden?

A midden is a fancy name for a pile of trash, often left by pack rats. Pack rats leave middens near their nests, which may be continuously occupied for hundreds, or even thousands, of years. Each layer of trash contains twigs, seeds, animal bones and other material, which is cemented together by urine. Over time, the midden becomes a treasure trove of information for plant ecologists, climate change scientists and others who want to learn about past climatic conditions and vegetation patterns dating back as far as 25,000 years. Great Basin National Park contains numerous middens.

Great Basin National Park

2007 Snow Survey Results Show Decrease

by Gretchen Baker, Ecologist, Great Basin National Park

The 2007 snow survey results show that the South Snake Range has received very little precipitation this past winter. The snow course consists of three sites located along Baker Creek. The Natural Resources Conservation Service (NRCS) out of Ely conducts measurements with assistance from volunteers twice each year. This important monitoring has been conducted since 1942, making it one of the longest datasets in the park. Past data is available at: http://www.wcc.nrcs.usda.gov/snowcourse/.

Although the lowest elevation site looked good at the end of February with a 94% average, by the end of March it had dropped to 21% of average. The other two sites were about 60% of average in both February and March.

Date	Site	Elevation (feet)	Snow depth (inches)	Snow water equivalent (inches)	Percent of average
28 Feb 2007	Baker 1	7,950	20	na	94%
28 Feb 2007	Baker 2	8,950	30	na	63%
28 Feb 2007	Baker 3	9,250	40	na	68%
29 Mar 2007	Baker 1	7,950	6	1.2	21%
29 Mar 2007	Baker 2	8,950	27	7.8	55%
29 Mar 2007	Baker 3	9,250	37	10.3	60%

Since many of the streams and springs in Great Basin National Park depend on the snowpack, it is likely that water levels will be considerably lower than average by the late summer. This impacts many aquatic organisms including fish as well as decreasing the recharge into the local aquifers. Diminished snowpack appears to be a trend throughout the West.

Reduced snowpack also allows some plants to grow sooner which increases the amount of vegetation (fine fuels) on the ground. When the plants stop growing, their remains provide additional fuel for fires. Across the West decreased snowpack and an earlier spring have been associated with increased wildfires.

Upcoming Events:

May 7-11 Kingsnake Surveys. Help find elusive kingsnakes in the second annual search. Contact Bryan Hamilton at the park for more information.
Memorial Day Weekend. Nightsky Program. Learn more about the beautiful night sky in some of the best visibility. Call the park for more information.
Fourth of July Weekend. Nightsky Program. Learn more about the beautiful night sky in some of the best visibility. Call the park for more information.
Oct 27 Great Basin National Park turns 21! The National Park was expanded from the Lehman Caves National Monument on October 27, 1986.
Throughout the Year, Great Basin National Park. Volunteer opportunities with resource management are available to help locate springs, conduct animal surveys, reclaim disturbed lands, and work on other projects. Contact us at 775-234-7331.